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To: People In Need of Environmental Safety

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Subject: Comments on Pines Area of Investigation Planning Documents

On behalf of People in Need of Environmental Safety (PINES), Geo-Hydro, Inc. (GHI) has reviewed the planning documentation that was prepared by the Respondents on the Pines Area of Investigation. The purpose of this review was to identify important issues contained in the documents that should be highlighted and explained to PINES, and, through PINES, to the general public. Hopefully, this review will meet three objectives. First, it may increase the understanding of these documents and the RI processes they describe. Second, it may promote discussion among the public, Regulators and Respondents. Third, it may provide a context within which ongoing investigations and reports can be reconciled. The planning documents reviewed by GHI included the following:

- Site Management Strategy
- Remedial Investigation/Feasibility Study (RI/FS) Work Plan – Volume 1: Work Plan Overview
- RI/FS Work Plan – Volume 2: Field Sampling Plan
- RI/FS Work Plan – Volume 3: Quality Assurance Project Plan
- RI/FS Work Plan – Volume 4: Health and Safety Plan
- RI/FS Work Plan – Volume 5: Human Health Risk Assessment Work Plan
- RI/FS Work Plan – Volume 6: Ecological Risk Assessment Work Plan
- RI/FS Work Plan – Volume 7: Quality Management Plan
- Yard 520 Sampling and Analysis Plan

General Observations

The planning documents for the Pines Area of Investigation are professionally prepared and present a focused description of the path the Respondents intend to take in completing the RI/FS at the Pines site. Within the constraints of technical jargon, the documents provide a clear representation of the conceptual logic, investigative approaches, and assessment methodologies that the Respondents expect to use. The planning documents are largely free of pretext that the objective of an RI/FS is to clean up contamination or restore water resources or environmental conditions to a previous state. These documents fairly describe a remedial investigation that focuses on identifying a limited number of contaminants within or derived from coal combustion residues that were disposed or placed within, or perhaps near, the Pines Area of Investigation. They describe the specific assessments of risk from those contaminants that will be performed. And, they clearly establish that the Respondents will not remediate contamination from placement or disposal of coal combustion residues except when risks exceed regulatory levels that require them to do so.

The planning documents reference to all coal combustion residues placed or disposed in and around the Pines Area of Investigation as coal combustion by-products or CCBs. CCBs are the subset of coal combustion residues that can be and are used as a by-product or for some purpose, such as road base or fill. Coal combustion residues that cannot be or are not so used and that are simply disposed are appropriately called coal combustion wastes or CCWs. The RI/FS for the Pines Area of Investigation clearly investigate both CCBs (*e.g.*, in roads and as topographic fills) and CCWs (*e.g.*, disposed in Yard 520). For the convenience of readers, this review will parallel the planning documents and only use the term CCBs.

Investigation and assessment issues addressed in the planning documents are usually identified first in the Site Management Strategy and they follow through to the appropriate locations in the Field Sampling Plan and Human Health Risk Assessment Plan. The following sections provide a short description of the contents of each planning document followed by specific comments where appropriate.

Site Management Strategy

The Site Management Strategy (SMS) lays out the strategy that the Respondents will use through the process of planning and implementing the collection and interpretation of monitoring and environmental data. The plan's stated purpose is to

- Review available historical and public information about the Pines Area of Investigation;
- Develop a preliminary conceptual model describing site conditions;
- Identify data gaps; and
- Outline a management strategy or approach to be used to conduct the RI and FS.

The SMS proceeds from identification of available information, through development of the preliminary conceptual model and identification of data gaps, to the outline of management strategy, as described. It does so without incorporating the results of site-specific groundwater sampling that has been conducted at Yard 520 since the early 1980s. The SMS relies upon data from regional studies that did not focus on the area of this investigation to the virtual exclusion of extensive and relevant site-specific data.

Specific comments on the SMS are provided below:

1) Section 3.5.1, page 3-16: The SMS acknowledges historical monitoring at and around Yard 520. In the discussion of possible sources of boron and molybdenum in groundwater, the SMS states

> Groundwater monitoring has been conducted at Yard 520 since at least the early 1980s up through the present (e.g., Weaver Boos, 2004). Boron and molybdenum have been detected in groundwater and surface water in the immediate vicinity of Yard 520. The extent to which these may be above background levels and whether Yard 520 may be a source of boron and molybdenum in groundwater and/or surface water beyond Yard 520 will be determined during the RI.

The Respondents chose to develop the preliminary conceptual model of the area of investigation without benefit of integrating the historical Yard 520 data with the regional data. The USEPA noted this decision in its review of the SMS (See USEPA comments 1, 11, 13, and 18 in SMS, Appendix O) and directed the Respondents to include assessments based on historical Yard 520 data. The Respondents' reply (also Appendix O, response to comment 18) was that if data and conditions they observe during the RI/FS are sufficient to make their decisions, "… it will not be necessary to evaluate historical conditions." The USEPA did not pursue the directed changes before allowing the SMS to be published.

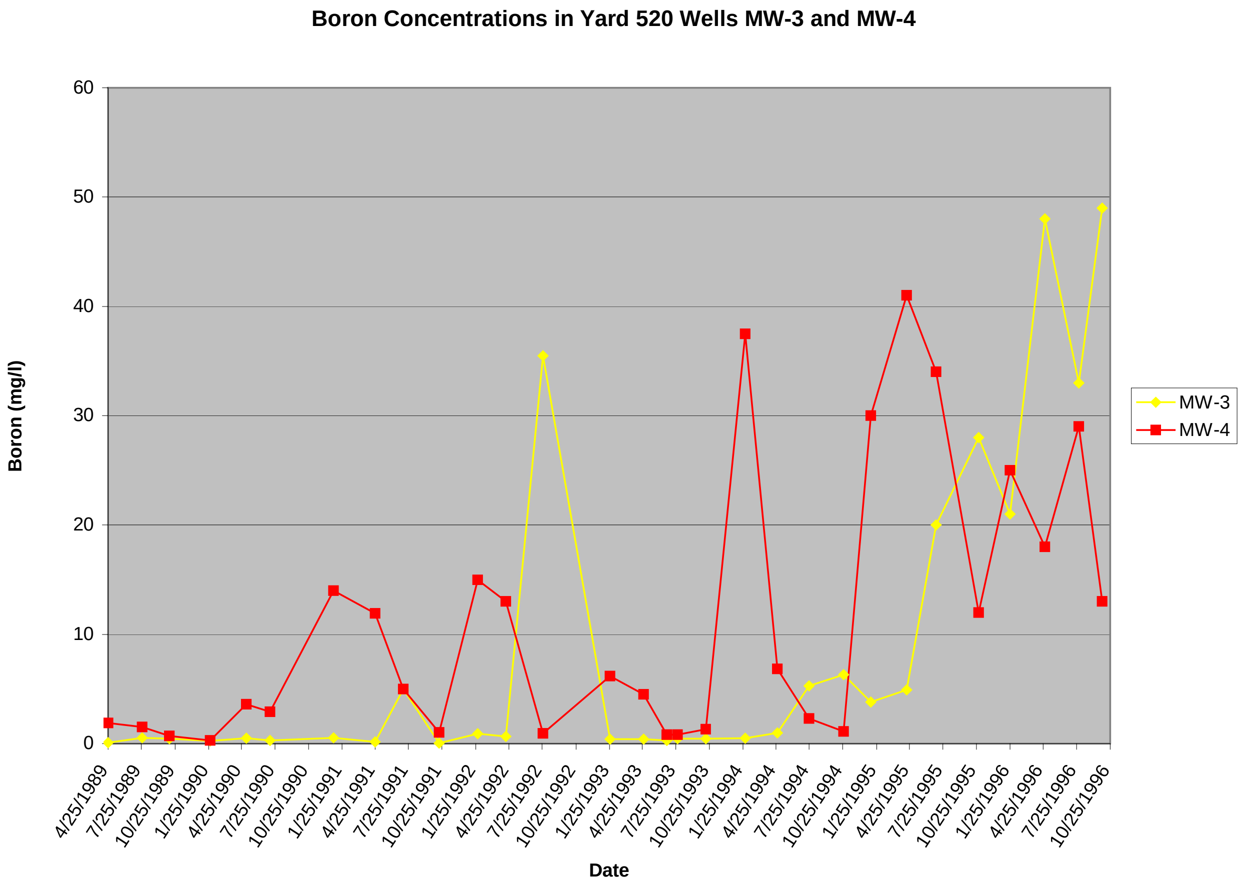
Choosing not to assess the historical trends and patterns allows the Yard 520 data to be discounted early in the RI/FS process with an implied uncertainty of its significance; *e.g.*, "... may be above background …", "…whether…", and "… may be a source …" Had the assessments been done, the significance of the data would be known and not subject to speculation.

The above quote also implies that integration of the historical Yard 520 data will be done as part of the Remedial Investigation (RI). However, there are no tasks outlined in the RI/FS work plan that expressly address this effort. (See, for example, SMS Table 2.)

The evaluation of historical groundwater quality and water elevation data from Yard 520 is fundamental to understanding the source(s) and distribution of boron, molybdenum, and other contaminants. These data represent trends in groundwater quality and patterns of migration over a period of many years, including changes that result from human activities that impact the hydrologic system. These are trends and patterns that the limited duration of remedial investigation sampling will not duplicate and for which it is not a substitute. The short-duration of an RI investigation may convey an adequate snapshot of conditions that exist today. Adequate RI decisions need also be made on reasonable future scenarios of exposure, not just existing conditions. In part, historical understanding is necessary to understand the rapidity with which conditions in the area of investigation can change when human activities change the current hydrologic regime.

The historical boron analyses around Yard 520 provide an example. GHI obtained historical data from the south unit of Yard 520 monitoring program (See bibliography in SMS Appendix A) and prepared a plot of boron concentrations from Yard 520 monitoring wells MW-3 and MW-4 over the period from 1989 to 1997 (see figure below). These data represent the early monitoring between the south unit of Yard 520 and the then recently-relocated Brown Ditch. The early data on this graph are baseline for these well locations, but do not necessarily represent natural background. This figure shows that boron concentrations in Yard 520 monitoring wells MW-3 and MW-4 were initially relatively low, with MW-3 typically below 0.9 mg/L. By the mid-1990s concentrations of boron for each well had increased by an order of magnitude and more.

These wells were located, constructed and sampled to monitor for downgradient impacts from the south unit of Yard 520, and were accepted by the agency for that purpose. There is no ambiguity or uncertainty. The south unit of Yard 520 is already shown to be a source of boron contamination to the local groundwater. Other monitoring wells similarly demonstrate that the north unit of Yard 520 is a known source of boron contamination to the local groundwater. (*E.g*, see the monitoring data reported in SMS Appendix L, Yard 520 Monitoring Data.)



A more thorough evaluation of all the available groundwater data, both old and newly generated, must be completed to address fully the boron contamination and that of other contaminants of concern. By choosing not to evaluate fully all available data, including historical groundwater monitoring data from and near Yard 520, the Respondents chose to understand less fully the source(s), migration patterns, migration mechanisms, and migration rates of contaminants of concern than they otherwise would. The Respondents chose to understand less fully the responsiveness of the hydrologic system to the influences of human activity than they otherwise would. Accepting the lower level of understanding generates the potential that the resulting RI is fatally flawed and the subsequent remedial activities are ineffective at protecting human health and the environment.

2) Section 3.6.3, page 3-25: The summary paragraph of the discussion of the potential for leaching from CCBs states,

> From a mass-balance perspective, CCBs will not be infinite sources of constituents to groundwater; i.e., leaching will decrease and eventually stop at some point in time. The time involved for this to occur would depend on the nature and extent of the deposit and specific environmental conditions.

EPA has recently published a study examining potential leachability of contaminants from coal combustion wastes in EPA/600/R-06/008, January 2006. The study examined the potential for leaching mercury, arsenic and selenium from disposed coal combustion residues (CCRs) over a 100-year period and found the following (page 78):

> Leachate concentrations and the potential release of mercury, arsenic and selenium do not correlate with total content in the CCR. … In addition, for many cases, the amount of mercury, arsenic and, or, selenium estimated to be released over a 100 year interval is a small fraction (< 0.1-5%) of the total content**.** For selenium, release from less than 5% up to the total content of selenium can be anticipated over the 100 year period. Therefore, it is not recommended to base landfill management decisions on total content of constituents in CCRs since total content does not consistently relate to quantity released.

This conclusion indicates that leaching from CCBs in the Pines area may continue for at least 100 years (the evaluation was limited to 100 years). The result is that for the people of Town of Pines, waiting for the source material to be depleted and stop contaminating the local environment could take generations.

3) Section 3.7.2, page 3-27: The discussion on background groundwater quality focuses on regional data from USGS investigations. The site-specific groundwater data from Yard 520 wells provides another indication of what background groundwater quality was like within the study area prior to, or shortly after the beginning of, CCB-related impacts. Use of site historical data for assessing background groundwater and surface water quality was ignored in developing the SMS and associated work plans.

4) Sections 5.3.3.1 and 5.3.3.2, page 5-12: In these sections the Respondents question the validity of the current Removal Action Levels (RALs) for boron and molybdenum. They imply that the RALs for

these constituents are too low considering that they have not been updated since 1997 and new information has been developed since then. The need for these comments is unclear. Similar comments appear to have been deemed unnecessary initially by USEPA (SMS Appendix O, USEPA comments 23 and 24). The comments appear to set the stage for a continuing dispute over potential use of these RALs by EPA in requiring remediation of the site.

5) Section 5.3.5, page 5-13: USEPA routinely requires that risk assessments use a carcinogenic hazard value of 1×10^{-6} or 1 in 1,000,000 excess cancers as the target level for evaluating the risks associated with a site. The discussion on Risk Characterization states that "… guidance will be used in the characterization of risk in the baseline HHRA" (human health risk assessment), *i.e.*, a site-specific alternative standard may be proposed and accepted if it is within USEPA guidelines. The Respondents cite the National Contingency Plan and one EPA directive as the guidance for the target risk level they anticipate using as the threshold for recommending remedial activities. The Respondents have determined that the target risk level they expect to use at the Pines site will be 1×10^{-4} or 1 in 10,000 excess cancers. Stated another way, the Respondents intend to seek regulatory and public acceptance of a 100-fold higher risk of an exposed person developing cancer over the course of a than the risk associated with USEPA's standard target level.

<u>Work Plan Overview– Volume 1</u>

The Work Plan Overview describes the organization of the seven volumes of the Work Plan, presents a summary of the Site Management Strategy and each of the subsequent RI/FS tasks. It also provides information on the personnel involved in the project and the originally anticipated schedule.

No specific comments were thought necessary on this volume.

<u>Field Sampling Plan – Volume 2</u>

The Field Sampling Plan provides detail on what and where field data and samples will be collected, procedures that will be followed in the field, and the anticipated schedule for field activities. In concept, collection of the data identified in this document provides a good start toward identifying the extent of CCB-related contaminants. Depending on the results of this work, additional phases may be required to fully develop the information on which to evaluate risk and/or remedial alternatives.

Specific comments on the Field Sampling Plan are provided below:

1) Section 1.2, page 1-3: The last sentence of this section indicates that the Feasibility Study will only be conducted to evaluate remedial alternatives "[i]f an unacceptable risk is identified..." To the citizens of Town of Pines this means that unless the soil or water is contaminated beyond a threshold that is negotiated with regulators, alternatives for stopping the contamination and cleaning-up the aquifer will not be evaluated. (See comment 5 on the Site Management Strategy, which discusses the expected use of a target risk level of 1 x 10^{-4}.)

2) Section 2.1.3, pages 2-3 and 2-4: The discussion on sampling of CCBs at Yard 520 indicates that 25 native soil samples from within the Pines Area of Investigation will be analyzed to document typical background concentrations. The samples are to be collected from 0 to 6 inches below ground surface. Sampling within this depth range will necessarily sample any wind-blown CCBs from Yard 520 and other areas of CCB placement, and any fugitive CCB dust and spillage from trucks hauling CCBs through the area of investigation. In such cases, the samples represent a mix of CCBs and background soils, rather than just natural soils. The unrecognized use of such analyses as background could underestimate the chemical and environmental impacts of CCBs in the area. An alternative sampling protocol, collecting samples from 6 to 12 inches below ground surface, is not proposed. This alternative protocol would reduce the potential for contamination from fugitive dust and spillage.

3) Sections 2.1.5 and 2.1.6, pages 2-5 and 2-6: These sections discuss methodologies for distinguishing among native soils, CCBs and other fills. Many RI tasks rely upon the ability to distinguish among these materials based upon simple visual examination. For example, the surface sampling of native soils and CCBs for chemical and leaching characterization presupposes a definitive visual difference. If they are not correctly identified based upon their visual examination, any conclusions based upon their chemical analyses or leaching characteristics will be invalid. In another example, whether or not to expand the area of investigation into adjacent areas, depends in part upon the visual examination of shallow shovel samples for CCBs; if none are identified, there will be no expansion regardless of other evidence consistent with CCB placement.

The discussion in Section 2.1.5 opines that it "is anticipated" fill materials and native soils "will have a distinctly different appearance in the field" and that "visual inspections are expected to be sufficient to distinguish" native materials from CCBs and other fills. The foundation for these expectations is not established, however. The description of native soil as "typically white to tan sands" (Section 2.1.5) is not dramatically different from that of fly ash described in the SMS in its Section 3.6.1. There unaltered fly ash is described as "generally light tan" and mostly silt-sized and clay-sized. Beyond the initially finer texture of fresh fly ash, it is unclear what definitive visual difference will be relied upon to achieve the discrimination between these materials as end members or when in some mixture.

Some materials are described as readily distinguishable from native soils with simple visual examination, such as a black material encountered while digging water mains. These are deemed "suspected CCBs" because they cannot be established as CCBs based upon visual examination. As Section 2.1.6 states

> As noted above, a conclusive identification of CCBs cannot be made in the field based solely on visual appearance. It is expected that additional testing or studies will be used to conclusively identify whether suspected CCBs are CCBs. The Respondents are in the process of evaluating laboratory and test methods to be used to determine, to the degree possible, whether suspected CCBs are actually CCBs.

What this means to the public is that there is a critical methodology that must yet be developed before many RI activities can be undertaken. Methods, including visual methods, that can be used to distinguish among soils, CCBs and other fill materials need to identified, critically reviewed, and accepted. Until those reliable methods are developed, the results from RI activities or tasks that are dependent upon accurate discrimination cannot be deemed valid and reliable.

4) Section 2.1.8, page 2-7: The RI anticipates precluding expansion of the area of investigation southward based upon the southward loss of the "surficial aquifer" against the Valparaiso Moraine, or the thinning of the "surficial aquifer" to the point below which it does not have "sufficient capacity" to serve as a water supply well. These determinations will be the result of document and literature review rather than RI investigations in the field. One exception is the possible analysis of water quality parameters from three private wells believed to be confined from the surface.

The public needs to understand several constraints that impact this approach. First, regional geologic studies do not necessarily have sufficient definition to determine if a shallow aquifer, such as the "surficial aquifer", is present at a specific location. This is especially true where locations of interest are near a formation boundary. Second, the appropriate determination that a shallow aquifer exists is the simple fact that people are using shallow wells for their water supply. This is based upon the standard, and often statutory, definition of an aquifer as a zone that produces sufficient water for an intended purpose. Thus a shallow private well establishes the existence of a shallow aquifer, whether or not there is a geologic description that is interpretable as the regional “surficial aquifer.” Third, even where the “surficial aquifer” is not present, a sand layer that serves a residence can be impacted by surface-sourced contaminants like CCB leachate even if overlain by clayey soils (hence, seemingly confined) if fractures or other conduits allow aquifer recharge from the surface.

Finally, it is noted this section twice makes reference to a United States Geologic Survey contract study of boron isotopes and tritium from a number of wells in and near the area of investigation. The unpublished, unreviewed, preliminary results of the analyses were discussed in a power-point presentation on April 19, 2005 at a public meeting. The data presented at that meeting are intriguing there is a suggestion that boron isotope analyses and tritium analysis may help discriminate among some water sources. However, the public needs to remember the USGS scientist declined to draw hard conclusions from many of those data, even when pressed to do so with questions after his presentation.

5) Section 2.4.3, page 2-16: The section on groundwater sampling identifies six Yard 520 monitoring wells (TW-15S, TW-15D, TW-16S, TW-16D, TW-18S and TW-18D) that will be sampled during the RI. This list omits several Yard 520 wells, including wells MW-3, MW-6, MW-8, MW-10 and TW12, that are identified in the discussion of sampling for radionuclides as having the highest boron concentrations over the last two years (See comment 6, below). Samples from all Yard 520 wells would provide a broader representation of the concentration of contaminants being discharged to Brown Ditch and/or as the source concentration of groundwater flow toward the north and east. The best determination of the concentrations of the Yard 520 source would be to install and sample one or more wells within the waste mass(es). Without this information, the highest concentration of contaminants in groundwater may not be considered in data interpretation and follow-on contaminant transport modeling. The piezometer in the north unit of Yard 520 allows collection of this critical data, were it so used. USEPA recognized the need for this data in multiple comments calling for this data in SMS Appendix O. In lieu of the RI collecting independent samples from the monitoring wells, results of on-going Yard 520 monitoring could be used to refine an understanding of the contaminant source term.

6) Section 2.4.3, Page 2-16: In its discussion of radionuclides, the text states

> Isoptopes of uranium (U-234, U-235, and U-238) and radium (Ra-226 and Ra-228) will be analyzed in samples from Yard 520 wells MW-3, MW-6, MW-8, MW-10, and TW-12, the five wells where boron concentrations have been the highest during the last two years. During the Supplemental Closure of the Type II (North) Area of Yard 520, some of these wells may not survive.

It is presumed that any monitoring wells that do not "survive" supplemental closure of the north area of Yard 520 will be properly abandoned. Failure to properly abandon them could leave them as conduits for migration of landfill leachate into groundwater. This could be exacerbated as the leachate level changes in the closed landfill. The loss of these wells will prevent evaluation and understanding of if and how closure changes the patterns of migration of contaminants away from Yard 520 and to Brown Ditch or through the residential neighborhoods around Yard 520. This is one of the few temporal changes to the hydrogeologic system caused by human activity that might be observed by RI monitoring. If these wells were replaced as part of the RI program, the changes could be observed.

<u>Volume 3 - Quality Assurance Project Plan</u>

The Quality Assurance Project Plan (QAPP) presents the organization, objectives, planned activities, and specific quality assurance/quality control (QA/QC) procedures associated with the RI/FS. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses are described.

No specific comments were thought necessary on this volume.

<u>Volume 4 – Health and Safety Plan</u>

The HASP establishes the health and safety procedures required to help minimize potential risk to personnel who will be performing the RI/FS field activities at the Pines Area of Investigation.

No specific comments were thought necessary on this volume.

Volume 5 – Human Health Risk Assessment Work Plan

The Human Health Risk Assessment Work Plan identifies methods to be used in evaluating human health risks using data collected as part of the RI/FS. The Respondents emphasize compliance of the HHRA work plan with the requirements of AOC II and the SOW. The implication is that compliance with the AOC II and the SOW is protective for the citizens of Town of Pines and the surrounding areas.

Specific comments on the HHRA Work Plan are provided below:

1) Section 2.4, page 2-4 and Figure 4: Human exposure to CCB-derived contaminants in solid materials can occur in a number of ways. The HHRA conceptual site model considers direct exposure to contaminants in surface and subsurface CCBs by inhaling dust, incidental swallowing and/or skin contact may affect various segments of the population. Direct exposure to contaminants in CCBs is conceptualized to occur in the following general ways:

- Direct exposure to surface CCBs is conceptualized by incidental swallowing and skin contact only by residents and construction workers (not recreational populations) and by inhaling dust by all segments of the population.
- Direct exposure to subsurface CCBs is conceptualized by pathways related to the excavation of the CCBs. These include incidental swallowing and skin contact by construction workers and by inhaling dust by all segments of the population.
- Direct exposure to surface CCBs is conceptualized by various types of contacts with surface water and sediments that may be impacted as a result of flooding and/or runoff that transports surface CCBs to water bodies.

The HHRA conceptual site model does not consider a number of exposure routes to CCB-derived contaminants in solid materials, including the following:

- Incidental swallowing and skin contact of/with subsurface CCBs by children who play at excavations sites are not considered.
- Runoff and/or flooding of excavation sites that expose subsurface CCBs, with transport to surface water bodies, is/are not among the exposure scenarios considered.

- The HHRA conceptual site model does not consider exposure to soils that contain CCB-derived contaminants, other than sediments associated with surface water bodies.

CCB-derived contaminants that leach from surface or subsurface CCBs will accumulate in adjacent or nearby soils by precipitating or absorbing into the soils in response to various geochemical and mineralogical gradients. This accumulation of CCB-derived contaminants in nearby soil is the natural and inevitable result of soil particles removing contaminants from impacted groundwater as it flows through the soil, mechanisms that are collectively termed attenuation of groundwater. Section 3.6.3 of the SMS, pages 3-22 through 3-25 extensively discusses the mechanisms by which individual CCB-derived contaminants are attenuated from leachate or groundwater. CCB-derived contaminants that attenuate from groundwater accumulate in soil. Since the degree to which contaminants concentrate in the soil is controlled by the chemical conditions in the soil, the contaminant concentrations in the soil can be higher than the concentrations in the original CCB.

As discussed in Section 3.6.3 of the SMS on page 3-24, arsenic is relatively easily mobilized from CCB but has a “high potential” for attenuation from groundwater. That high potential for attenuation means a high potential for arsenic to concentrate in the soils near the CCB source. Since the HHRA conceptual site model does not consider any exposure scenarios for soils impacted with CCB-derived contaminants, there are no tasks to locate, map, or analyze these materials. There are no defined tasks to determine which soils are likeliest to accumulate CCB-derived contaminants, which CCBs are the likeliest to significantly contaminate surrounding soils, and how far from areas of CCB placement the impacts have occurred or will occur.

Characterization tasks that are proposed for CCBs with acknowledged exposure paths are not proposed for CCB-impacted soils. CCB-derived contaminants that leach from CCB, migrate, and accumulate in nearby soils demonstrate mobility under naturally occurring geochemical conditions; they are clearly not bound in the CCB matrix. As such, they are potentially more injurious to human health and the environment than the portions that remain in the CCBs, but the potential is not assessed. For example, bioavailability studies for risk assessments that evaluate CCBs themselves assess only the bioavailability of the less mobile fraction of the CCB contaminants that remain in place, not that of the more mobile fraction in impacted soils. Comparable characterization of soils near CCB sources is required to evaluate the magnitude and extent of soil impacts due to natural accumulation of soluble contaminants and the risks associated with those soils.

Because the RI does not include investigation of CCB-derived contaminants in soils, there are no risk assessment tasks for these materials. Absent remedial investigations and risk assessments, there will be no feasibility studies of how properly to manage these materials. The result can be decisions that are inconsistent and potentially non-protective. For example, the final Feasibility Report might conclude that certain CCB fills should be exhumed and taken to a landfill if disturbed by future excavation or development. Since soils are not addressed in the RI/FS, adjacent, more heavily contaminated soils might be allowed as top dressing on a playground or sold as clean fill.

2) USEPA routinely requires that risk assessments use a cumulative carcinogenic hazard value of 1 x 10^{-6}, or 1 in 1,000,000, excess cancers as the cumulative target level for assessing the risks associated with a site. USEPA's comment on the HHRA Work Plan and the Respondents' reply are provided below:

> **HHRA.11 - Section 6.2 Middle of pg. 6-2. Please edit to read "A cumulative target risk level of 10^{-6} will also be used as an initial level to evaluate the risk assessment results. If remedial action is determined to be necessary, site specific information may result in a revision of the target risk level."**
>
> *Response: USEPA states in Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions (OSWER Directive #9355.0-30, April 1991) that:*
> *"Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4}, and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted, unless there are adverse environmental impacts."*
>
> *The Statement of Work (SOW) for the Area of Investigation indicates that the HHRA will be conducted in accordance with several USEPA guidance documents, including the aforementioned document. Based on the document, remedial actions will not be recommended where the cumulative risk is less than 10^{-4}. Therefore, using a target risk level of 10^{-6} to initially evaluate the risk assessment results is not warranted and may result in unnecessary confusion regarding the conclusions of the HHRA. Therefore, the suggested change will not be made. All results will be presented clearly in the tables supporting the HHRA, which will allow the reader to easily identify potential risks at any level.*

The residents of Town of Pines and adjacent areas should carefully note this exchange. The USEPA explicitly directed an edit to the HHRA Work Plan to require the initial risk assessment be evaluated relative to the standard 1 per 1,000,000 excess cancers, with the acknowledgement that, subsequent to that initial evaluation, site-specific information may result in acceptance of a revised, less protective, target risk level. The Respondents replied to the USEPA, “No.” The agency acquiesced to the Respondents’ refusal of the directed edit.

The public should clearly understand that a cumulative cancer risk that is higher than the 1 per 1,000,000 USEPA standard might eventually be accepted by the Agency, depending upon site-specific conditions. The public should also clearly understand that the Respondents intend to promote a cumulative cancer risk that is 100-fold greater than the USEPA standard threshold. And, the public should clearly understand that, if the relaxed threshold that is anticipated by the Respondents were ultimately accepted by the USEPA, the Respondents would potentially leave higher concentrations of contaminants in the groundwater or soils without being required to mitigate, perform remedial actions or supply alternative water supplies. (See also comment 5 for SMS.)

Volume 6 – Ecological Risk Assessment Work Plan

The Ecological Risk Assessment (ERA) will be conducted using a tiered process, the first tier of which is the Screening-level Ecological Risk Assessment (SERA). Results of the SERA will determine what, if any, additional ecological risk assessment may be needed for the Area of Investigation. This work plan focuses on the methods to be used to develop the SERA.

The SERA will evaluate risk to three major ecosystems: surface water bodies, wetlands, and terrestrial uplands. Specifically the SERA will

- Evaluate the potential risk of CCB-derived constituents in surface water and sediments in the Brown Ditch system and other affected water bodies to aquatic communities (fish and benthos), wetland plants, and wildlife receptors;
- Evaluate the potential risk due to groundwater transport of CCB-derived constituents and subsequent wetland plant root uptake and exposure to wildlife receptors in wetlands; and
- Evaluate the potential risk due to CCBs present at the ground surface and exposure to CCB-derived constituents by terrestrial ecological receptors in upland terrestrial areas.

No specific comments were thought necessary on this volume.

Yard 520 Sampling and Analysis Plan

The purpose of the Yard 520 Sampling and Analysis Plan (SAP) is to determine whether additional parameter groups, specifically, polychlorinated dibenzodioxins and dibenzofurans (PCDDs and PCDFs), radionuclides, and polycyclic aromatic hydrocarbons (PAHs), may be present at concentrations of potential concern in CCBs in the Pines Area of Investigation, and whether the analytical program for the RI should include any of these constituents. These compounds include some of the most toxic and persistent chemicals known. The plan calls for collection 10 samples from within the south unit of Yard 520 and 20 background soil samples from around the area for comparison. Each sample will be analyzed for the parameter groups of potential concern.

Specific comments on the Yard 520 Sampling and Analysis Plan are provided below.

1) Section 2.2, pages 2-2 and 2-3: The only CCB samples to be collected to evaluate PCDDs, PCDFs, radionuclides, and PAHs are to be collected from the south unit of Yard 520. The south unit of Yard 520 reportedly has been excavated below the surficial aquifer and reportedly has excavated clay side-walls. In contrast, the north unit does not have clay side-walls and did not fully excavate the underlying surficial aquifer. With no engineered containment, the north unit is the more likely source for major offsite migration.

The Respondents' rationale for sampling only the South Area is that there is less opportunity for inadvertent inclusion of non-CCB materials (*e.g.*, steel slag) into the samples. If the Respondents' arguments that other waste streams are not be present in the south unit are true and the north unit could potentially contain other source materials, then the proposed sampling of only the south unit is likely unrepresentative of the combined sources of contamination.

Yard 520 is the largest single potential source for the contaminants that are found in the local environment. To the residents of Town of Pines, it makes no difference if the specific source of contamination is CCBs or steel slag or some other waste. Their concern is for the quality of their water and soil and impacts on their health and environment. To the citizens of Town of Pines, anything that comes from Yard 520 is of concern.

The Respondents, on the other hand, due to the negotiated terms of the AOC II, as being implemented in the RI/FS program, are responsible to investigate, and perhaps remediate, only that portion of the contamination that can be directly attributed to CCBs. This approach of parsing the total contamination levels to only that fraction that is due to this single waste material is why many RI activities are so critical. Examples of these include the need for accuracy with respect to visually distinguishing among soils and various fill types (See, for example, comment 3 to RI Field Sampling Plan – Volume 2, above) and being absolutely certain that samples used to define background soils not include any fugitive CCBs (See, for example, comment 2 to RI Field Sampling Plan – Volume 2, above, and comment 2, immediately below.).

Characterizing only the wastes in the south unit is proffered as a means to ensure that waste characterization will include only concentrations of dioxins, furans, PAHs and radionuclides that are attributable to CCBs, and not those attributable to other wastes. To be valid, this sampling program necessarily assumes that the CCBs disposed in the north unit do not differ in any significant way with respect to the concentrations of these contaminants from those of the south unit. This sampling program also necessarily assumes that CCBs placed elsewhere in and adjacent to the area of investigation are comparably similar in composition to those analyzed from the south unit.

It is not clear that these assumptions are warranted. The SMS discusses the variability of CCBs and factors that contribute to CCB variability in SMS Section 3.6 Description of CCBs. CCB variability is described as being a function, among other things, of the type of CCB (*e.g*., bottom ash, fly ash, *etc*.) of the source of the coal, the generating facility that produces the CCB, CCB management practices, and pollution control equipment. It is known that some of these variables changed over the decades that disposal occurred at Yard 520. For example, slurried ash is known to have been disposed at the north unit. Slurrying the ash at the Michigan City station stopped in 1998. Michigan City CCB sampled from shallow in the south unit does not represent this management practice. Little or no information regarding how the sources of the fuel coal changed (regional or mine-specific source changes) through the years is provided, so this variable is unaddressed by the sampling program. It is known that CCBs from the Bailly station were disposed at Yard 520 at times, but it is not established that those CCBs will be sampled under the proposed program. Information on the CCBs disposed or used outside Yard 520 in and around the area of investigation is virtually totally lacking.

An alternative exists to the assumption of uniformity among all CCBs in and around the area of investigation, and the corollary that 10 samples from the south unit of Yard 520 can adequately characterize any variability with respect to these constituents. Since other RI tasks require establishing methodologies to distinguish among CCBs, soils, and other fills, once those methodologies are established, it becomes possible to reliably sample CCBs from the north unit of Yard 520 without inadvertently sampling other waste types. The ability to so distinguish among wastes is the basis for the sampling in the north unit for TALs and other CCB-related contaminants. If non-CCB wastes can be avoided for that sampling program, those samples can also be analyzed for PCDDs, PCDFs, radionuclides, and PAHs. It also becomes possible to reliably sample CCBs that are fills or that are disposed in and around the area of investigation at locations other than Yard 520. Were such an alternative sampling program undertaken, uncertainties would be reduced and data, rather than assumptions, could be relied upon for this assessment.

2) Section 4.3, page 4-3: Many of the selected background sample locations are very close to either Yard 520 or transportation routes used by trucks approaching and leaving Yard 520. The very nature of landfill operations inherently creates conditions for dust generation and windblown transport of disposed materials. Collection of background samples from the top 6-inches of soil near Yard 520 invites between CCBs and background materials. Eliminating the upper 6-inches and collecting samples from 6 to 12-inches would result in a more representative characterization of background soil values. (See also comment 2 for RI Field Sampling Program, Volume 2.)